CLAIMS

What is claimed is:

1. A packet processing system comprising:

5   a packet classification system comprising:

a first packet parser for parsing a packet and providing first data representative thereof; and

a packet classification engine for classifying the packet responsive to the first data;

10   a packet modification system comprising:

a second packet parser for parsing a packet derived from the classified packet and providing second data representative thereof;

a packet modification engine for modifying some or all of the packet responsive to the second data;

15   a third packet parser for parsing the modified packet and providing third data representative thereof; and

a packet post-processor for processing the modified packet responsive to the third data.

2. The packet processing system of claim 1 wherein the packet

20   undergoing processing by the system has a plurality of encapsulation layers, and each of the first, second and third parsers is configured to parse the packet by providing context pointers pointing to the start of one or more of the encapsulated layers.

3. The packet processing system of claim 2 wherein the packet undergoing processing by the system comprises a first packet forming the payload

25   portion of a second packet, each of the first and second packets having a plurality of encapsulation layers, and each of the first, second and third parsers is configured to parse the packet by providing context pointers pointing to the start of one or more of the encapsulated layers of the first packet and one or more of the encapsulated layers of the second packet.

4.   The packet processing system of claim 1 wherein the packet post-processor is configured to compute a checksum for the modified packet.

5.   The packet processing system of claim 1 wherein the packet post-processor is configured to perform egress marking of the packet.

6.   A packet processing system comprising:

a packet classification system configured to analyze a packet and, responsive thereto, selectively change the state of a control bit maintained in the packet processing system from a first state to a second state; and

a packet modification system configured to modify the packet, or a packet derived there-from, and detect the control bit to determine if egress mirroring of the modified packet is activated, and if so, providing a copy of the modified packet to the packet classification system.

7.   The system of claim 6 wherein the control bit is associated with the packet.

8.   A packet processing system comprising:

a packet classification system for providing a multi-dimensional quality of service indicator for a packet; and

a packet modification system for selectively modifying one or more quality of service fields within the packet, or a packet derived there-from, responsive to at least a portion of the multi-dimensional quality of service indicator.

9.   The system of claim 8 wherein the multi-dimensional quality of service indicator comprises an ingress quality of service indicator, an egress quality of service indicator, and packet marking control information, and the packet modification system is configured to selectively modify one or more quality of service fields within the packet responsive to the packet marking control information.

10.   The system of claim 9 wherein the multi-dimensional quality of service indicator further comprises a host quality of service indicator.

11.   The system of claim 9 wherein the ingress quality of service indicator functions as an ingress queue select for a network element coupled to the packet processing system.

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12.   The system of claim 9 wherein the egress quality of service indicator functions as an egress queue select for a network element coupled to the packet processing system.

13.   The system of claim 10 wherein the host quality of service indicator

5   functions as an ingress queue select for a host coupled to the packet processing system.

14.   A cascaded combination of multiple, replicated packet processing systems comprising:

a first replicated packet processing system having ingress and egress portions

10   and a second replicated packet processing system having ingress and egress portions,

wherein the egress portion of the first packet processing system is coupled to the ingress portion of the second packet processing system,

and the first replicated packet processing system is configured to perform partial processing of the packet, and the second replicated packet processing system is

15   configured to complete processing of the packet.

15.   The cascaded combination of claim 14 wherein the first replicated packet processing system is an intermediate replicated packet processing system preceded by one or more replicated packet processing systems.

16.   The cascaded combination of claim 14 wherein the first replicated

20   packet processing system is not preceded by any replicated packet processing systems.

17.   A method of processing a packet comprising:

parsing a packet and providing first data representative thereof;

classifying the packet responsive to the first data;

25   parsing the classified packet, or a packet derived there-from, and providing second data representative thereof;

modifying the packet responsive to the second data;

parsing the modified packet and providing third data representative thereof; and

30   processing the modified packet responsive to the third data.

18.   The method of claim 17 wherein the packet undergoing processing has a plurality of encapsulation layers, and each of the first, second and third parsing steps comprises providing context pointers pointing to the start of one or more of the encapsulated layers of the packet.

19.   The method of claim 17 wherein the packet undergoing processing comprises a first packet forming the payload portion of a second packet, each of the first and second packets having a plurality of encapsulation layers, and each of the first, second and third parsing steps comprises providing context pointers pointing to the start of one or more of the encapsulated layers of the first packet and one or more of the encapsulated layers of the second packet.

20.   The method of claim 17 wherein the processing step comprises computing a checksum for the modified packet.

21.   The method of claim 17 wherein the processing step comprises egress marking of the packet.

22.   A method of processing a packet comprising:

in a packet classification system, analyzing a packet and, responsive thereto, selectively changing the state of a control bit from a first state to a second state; and

in a packet modification system, modifying the packet, or a packet derived there-from, detecting the control bit to determine if egress mirroring of the modified packet is activated, and if so, providing a copy of the modified packet to the packet classification system.

23.   The method of claim 22 wherein the control bit is associated with the packet.

24.   A method of processing a packet comprising:

providing a multi-dimensional quality of service indicator for a packet; and

selectively modifying one or more quality of service fields within the packet, or a packet derived there-from, responsive to at least a portion of the multi-dimensional quality of service indicator.

25.   The method of claim 24 wherein the multi-dimensional quality of service indicator comprises an ingress quality of service indicator, an egress quality of

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service indicator, and packet marking control information, and the selective modifying step comprises selectively modifying one or more quality of service fields within the packet responsive to the packet marking control information.

26. The method of claim 25 wherein the multi-dimensional quality of service indicator further comprises a host quality of service indicator.

27. The method of claim 25 further comprising utilizing the ingress quality of service indicator as an ingress queue select.

28. The method of claim 25 further comprising utilizing the egress quality of service indicator as an egress queue select.

29. The method of claim 26 further comprising utilizing the host quality of service indicator as an ingress queue select for a host.

30. A method of processing a packet in a cascaded combination of multiple, replicated packet processing systems comprising:

performing partial processing of a packet in a first replicated packet classification system; and

completing processing of the packet in a second replicated packet processing system.

31. The method of claim 30 wherein the first replicated packet processing system is an intermediate replicated packet processing system preceded by one or more replicated packet processing systems.

32. The method of claim 30 wherein the first replicated packet processing system is not preceded by any replicated packet processing systems.

33. A packet processing system comprising:

a packet classification system comprising:

first packet parsing means for parsing a packet and providing first data representative thereof; and

packet classification means for classifying the packet responsive to the first data and providing data representative of the packet classification, including analyzing the packet and, responsive thereto, selectively changing the state of a control bit if egress

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mirroring of the packet is warranted, and assigning a multi-dimensional quality of service indicator to the packet;

a packet modification system comprising:

second packet parsing means for parsing the packet or a packet derived there-from and providing second data representative thereof;

packet modification means for modifying the packet, or one or more portions thereof, and providing a modified packet;

third parsing means for parsing the modified packet, and providing third data representative thereof;

post-processing means for post-processing the modified packet responsive to the third data, including modifying one or more quality of service indicators in the packet responsive to at least a portion of the multi-dimensional quality of service indicator; and

means for detecting the state of the control bit, and providing a copy of the modified packet to the packet classification system if the control bit indicates that egress mirroring of the packet is activated.

34. A method of processing a packet comprising:

in a packet classification system, performing the following steps:

a step for parsing a packet and providing first data representative thereof; and

a step for classifying the packet responsive to the first data and providing data representative of the packet classification, analyzing the packet and, responsive thereto, selectively changing the state of a control bit if egress mirroring of the packet is warranted, and assigning a multi-dimensional quality of service indicator to the packet;

in a packet modification system, performing the following steps:

a step for parsing the packet or a packet derived there-from and providing second data representative thereof;

a step for modifying the packet, or one or more portions thereof, and providing a modified packet;

a step for parsing the modified packet, and providing third data representative thereof;

a step for post-processing the modified packet responsive to the third data, including modifying one or more quality of service indicators in the packet responsive to at least a portion of the multi-dimensional quality of service indicator; and

a step for detecting the state of the control bit, and providing a copy of the modified packet to the packet classification system if the control bit indicates that egress mirroring of the packet is activated.

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